## APPLICATION NO 10/609185

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## **CLMPTO**

- 1. A semiconductor device comprising:
  - a layer of semiconductor material;
  - a plurality of regions of first and second opposite conductivity-types disposed in the layer of semi-conductor material;

one region of the plurality comprising an anode-emitter;

another region of the plurality of regions comprising a cathode-emitter;

the cathode-emitter of conductivity type opposite to that of the anode-emitter;

at least two regions of the plurality of regions disposed between the anode-emitter and the cathode-emitter;

the anode-emitter defining a junction where it meets one of the at least two regions;

- a first electrode disposed over at least one of the regions between the anode and the cathode emitters; and
- epitaxial material on the cathode and/or anode-emitter regions of the layer of semiconductor material;
- the epitaxial material offset laterally from and clear of the junction of the anode and/or cathode emitter region(s) at the surface of the layer of semiconductor material.
- 2. The device of claim 1, further comprising silicide on at least a portion of the epitaxial material.
- 3. The device of claim 2, the first electrode comprising polysilicon and silicide on at least a portion of the polysilicon as a gate electrode.
- 4. The device of claim 2, in which

- the epitaxial material comprises a peripheral edge where it meets the surface of the layer of semiconductor material; and
- the layer of semiconductor material comprises a region between the peripheral edge of the epitaxial material and the first electrode that is free of silicide.

## 5. The device of claim 4,

- the anode-emitter, the cathode-emitter, and the at least two different regions of the alternating regions therebetween defining a thyristor;
- the two different regions between the anode and the cathode-emitters to establish first and second base regions respectively of the thyristor; and
- the first electrode disposed over a substantial width of the second base region and over a portion of the cathode-emitter neighboring the second base;
- the surface region free of silicide between the peripheral edge of the epitaxial material of the anode-emitter and a peripheral edge of the first electrode, extending laterally over a portion of the anode-emitter region, the full width of the first base region of the thyristor and a portion of the width of the second base region.
- 6. The device of claim 2, further comprising:
  - a conductor to propagate a reference voltage;
  - the conductor electrically coupled to the silicide of at least one of the anode and the cathode emitters.

## 7. The device of claim 6, in which:

- the layer of semiconductor material further comprises source, drain and channel regions to define at least in part an access transistor;
- one of the source and drain region of the access transistor in common with one of the cathodeemitter and the anode-emitter; and

the device further comprises:

a gate electrode over the channel region of the access transistor, the gate operable under voltage bias to apply an electric field to the channel region; and

epitaxial material on the other of the source and drain region;

silicide on the epitaxial material over the other of the source and the drain region; and

a bitline in electrical contact with the silicide of the other of the source and drain region.

8. The device of claim 7, further comprising:

first and second sidewall spacers against respective first and second opposite sidewalls of the first electrode;

the first sidewall spacer over the cathode-emitter and comprising a first lateral width that extends outward from the electrode; and

the second sidewall spacer comprising a lateral width that extends outward from the electrode by a distance substantially greater than the first lateral width.

9. The device of claim 8, further comprising:

epitaxial material on the shared emitter-source and drain region;

the epitaxial material on the emitter comprising a peripheral edge that is laterally offset from the first electrode by a magnitude related to the first lateral width of the first sidewall spacer; and

the epitaxial material of the anode-emitter laterally offset from the first electrode by a magnitude at least as great as the lateral width of the second sidewall spacer.

10. A memory device comprising:

a thyristor formed in a layer of semiconductor material, the thyristor comprising:

an anode-emitter;

first and second base regions of different polarities between the anode-emitter and the cathode-emitter;

- a first electrode over at least a portion of and capacitively coupled to the first base region;
- the second base region formed in a position of the layer of semiconductor material that is offset laterally and outwardly from an edge of the first electrode; and
- a raised provision of semiconductor material on the layer of semiconductor material as a raised portion of at least one of the anode-emitter and cathode-emitter;
- the raised portion of the anode-emitter comprising sidewalls that define at least in part an outline at the surface of the layer of semiconductor material and spaced laterally from the second base region.
- 11. The device of claim 10, further comprising:

an access transistor to access the thyristor;

- the access transistor comprising source, drain and body regions within the layer of semiconductor material, the body region in contiguous relationship between the source and drain regions; and
- raised source and drain provisions on the layer of semiconductor material and over the respective source and drain regions.
- 12. The device of claim 11, one of the source and drain regions of the access transistor in common with one of the cathode-emitter and anode-emitter of the thyristor within the layer of semiconductor material.
- 13. The device of claim 11, in which the raised provisions for the anode-emitter, source and drain regions comprise epitaxial material.
- 14. The device of claim 13, the layer of semiconductor material comprising a layer of silicon over an insulator.

- 15. The device of claim 14, in which the thickness of the layer of silicon over the insulator is less than 50 nm.
- 16. The device of claim 11, further comprising silicide on at least one of the raised provisions of the anode-emitter, the source and the drain regions.
- 17. The device of claim 16, in which each of the thyristor electrode and a gate electrode of the access transistor comprise:
  - polysilicon in insulated relationship over the layer of semiconductor material; and silicide on at least a portion of the polysilicon.
- 18. The device of claim 10, further comprising silicide-blocking material over the layer of semiconductor material and between the raised provision and the first electrode.

CLAIMS 19-57 (CANCELLED)